6 Lake Street, Lawrence, MA 01841
1-800-446-1158 / (978) 620-2600 / Fax: (978) 689-0803
Website: http: //www.microsemi.com

TECHNICAL DATA SHEET

1 Amp SOLID STATE RELAYS

DEVICES

MHS2501 Series
(Consult Table 3 for Part Number Designations)

LEVELS AVAILABLE
COTS
CLASS H
CLASS K

FEATURES

- Operates from 3.3V to 5V logic levels
- Internal Switch rated for 175°C T_j
- 250V Operation (Note 1)
- Total dose capable > 300 Krads (Note 3)
- > 1000V of I/O isolation
- Buffered input
- Inputs protected against over voltage (ESD rating of 1C)
- Preliminary SE results show no SEB through an LET of 85 (MeV / (mg / cm^2)) at a fluence of $2e^6$ ions / cm^2

DESCRIPTION:

The MHS series are Solid State Relays where the input and output circuitry are isolated from each other. The series consists of singles, duals, quads, and octals, and provides the normally open (N.O.) function. Microsemi Solid State Relays are designed for Space Flight Applications, and come packaged in a variety of hermetic configurations. These units have buffered logic level inputs and can be controlled from 3.3V or 5V logic signals, thus providing greater flexibility of design.

Table 1 – ABSOLUTE MAXIMUM RATINGS (*Tc = +25°C unless otherwise noted)*

Parameters / Test Conditions	Symbol	Value	Unit
Input Voltage	V_{in}, V_L	+15	Vdc
Output Current (Note 2)	Io	2.25	A
Output Voltage (Note 1)	V_O	250	Vdc
Weight			Grams
Temperature Range, Base of Package	T_C	-55 to +125	°C
Storage Temperature Range	T_{stg}	-65 to +150	°C
Lead Temperature	T_L	300	°C
Junction Temperature, FET Switch	T_j	175	°C

THERMAL CHARACTERISTICS

Parameters / Test Conditions	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	17	°C/W

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Table 2 – ELECTRICAL CHARACTERISTICS, PER CHANNEL
(T_C = +25°C, V_L = 5 Volts, V_{in} = 0 V or 3.3V as appropriate, unless otherwise noted)

Parameters / Test Conditions	Symbol	Min.	Nom	Max.	Unit
Minimum Input Activation Voltage Io = 1A, TC = -55 to +125°C	Vin(min)	3.0			V
Input - Output Leakage Vio = 1kV for 5 sec. (Note 4)	Iio			1	µA
Output Capacitance (Note 4) Vds = 100V	Coss		20		pF
Output on Resistance Id = 1A	Rds(on)		0.6	0.75	Ω
Output on Resistance Id = 1A, Tj = 125°C	Rds(on)		1.3	1.5	Ω
Output Leakage Vin = 0, Vo = 100V	Io_1		1	100	µA
Output Leakage Vin = 0, Vo = 80V, Tj = 125°C	Io_2		1	100	µA
Input Buffer Supply Current VL = 5V, TC = 25°C, 125°C	Ih		10	15	mA
Current to Activate Vin = 3.3V VL = 5V, T_C = -55 to +125°C	Iin		400	600	µA
Turn On Delay (See Figure 6) VS = 28V, RL = 250Ω, TC = -55 to +125°C	ton		30	45	µS
Turn Off Delay (Figure 6) VS = 28V, RL = 250Ω, TC = -55 to +125°C	toff		20	30	µS
Rise Time (Figure 6) VS = 28V, RL = 250Ω (Note 4)	tr		50	75	µS
Fall Time (Figure 6) VS = 28V, RL = 250Ω (Note 4)	tf		5	10	µS

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Table 3 – MODEL NUMBER FUNCTIONALITY CHART

MODEL NUMBER	ELECTRICAL RATINGS		RELAY CONFIGURATION				PACKAGE TYPE			
	Voltage	Amps	Single SPST N.O.	Dual SPST N.O.	Quad SPST N.O.	Octal SPST N.O.	8 Pin Flat Pack	16 Pin Flat Pack	32 Pin Flat Pack	64 Pin Flat Pack
MHS2501OF$-&	250	1	✓				✓			
MHS2501DF$-& 1/	250	1		✓				✓		
MHS2501QF$-& 1/	250	1			✓				✓	
MHS2501KF$-& 1/	250	1				✓				✓

Replace "$" with letter to denote required screening level
C = COTS
H = CLASS H
K = CLASS K

Replace "&" with lead bend option
1 = No lead bend
2 = SMT lead bend
3 = Lead bend down
4 = Lead bend up

1/ Consult Factory

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Table 4 – RELIABILITY SCREENING OPTIONS

	C	H	K	MIL-STD-883 METHOD
	COTS	EQUIVALENT MIL-PRF-38534 (Note 3)		
Element Evaluation	N/A	Class H	Class K	
Non-Destruct Wirebond Pull	N/A	Sample	100%	2023
Pre-Cap Visual	N/A	100%	100%	2017
Temperature Cycle	N/A	100%	100%	1010
Constant Acceleration	N/A	100%	100%	2001
PIND	N/A		100%	2020
Pre-Burn In Electrical	N/A	100%	100%	
Burn In	N/A	100% (160 hours)	100% (320 hours)	1015
Final Electrical Tests	100% (25C)	100%	100%	
Hermeticity (Fine and Gross Leak)	100%	100%	100%	1014
X-Ray	N/A	N/A	100%	2012
External Visual	Sample	100%	100%	2009
Certified	N/A	Yes	Yes	

NOTE:

(1) Internal switch is rated for > 1000 Volts breakdown. Consult factory for use at Voltages greater than 250 Volts.
(2) Current handling capability depends upon allowable Tcase and allowable T_j. See Figure 1.
(3) Microsemi does not at this time have a MIL-PRF-38534 qualified radiation hardness assurance program.
(4) Guaranteed by design.
(5) Because of the relatively slow switching times involved in power SSRs, it is important to stay within the allowances of the performance curves.

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Figure 1: Maximum Switch Current as a Function of Case Temperature (per Channel) (Note 2)

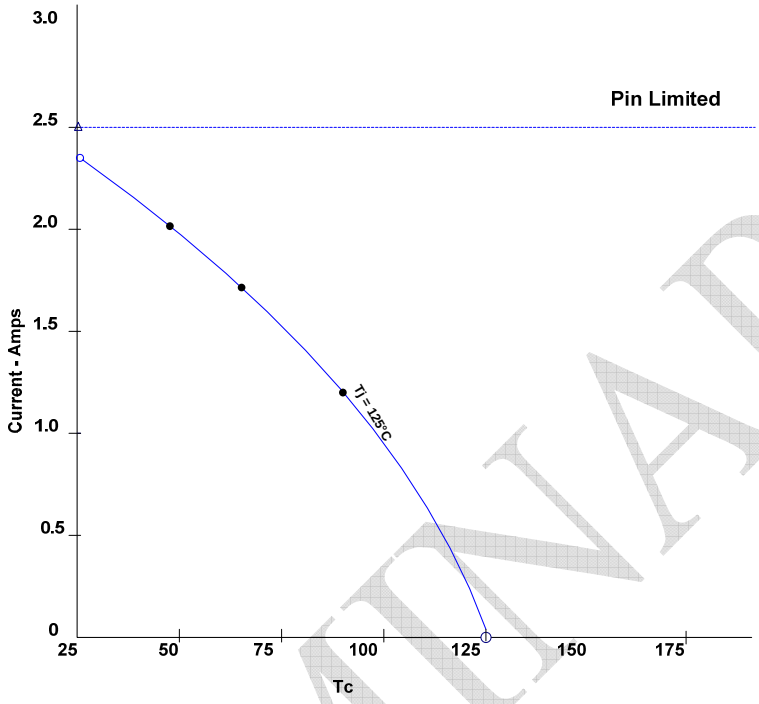

Figure 2: Recommended Operating Area

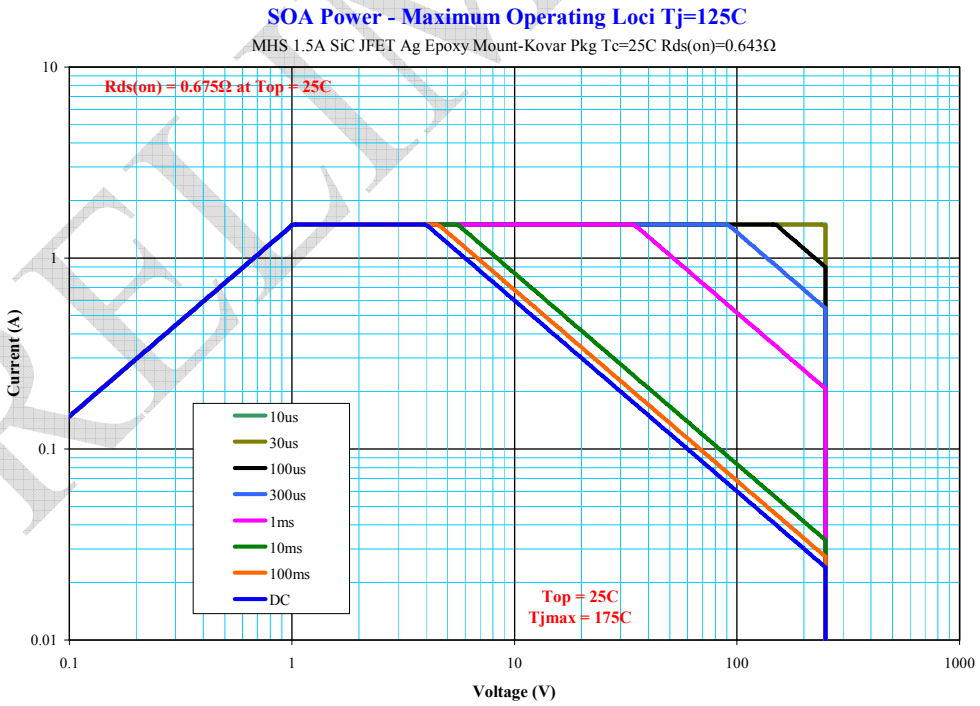

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Figure 3: Transient Thermal Impedance (Note 5)

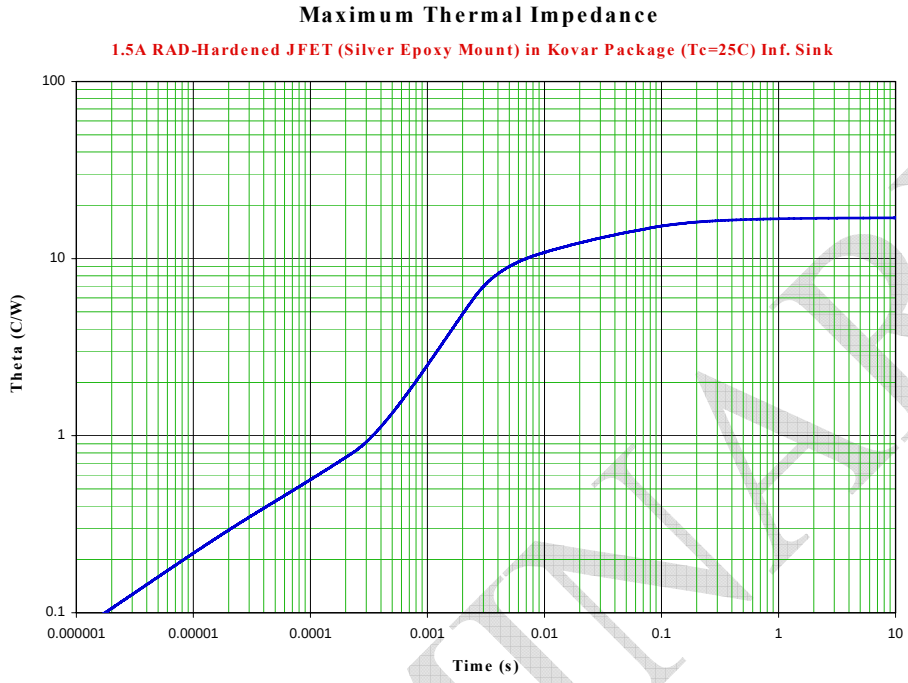

Figure 4: Typical On Resistance as a Function of Junction Temperature

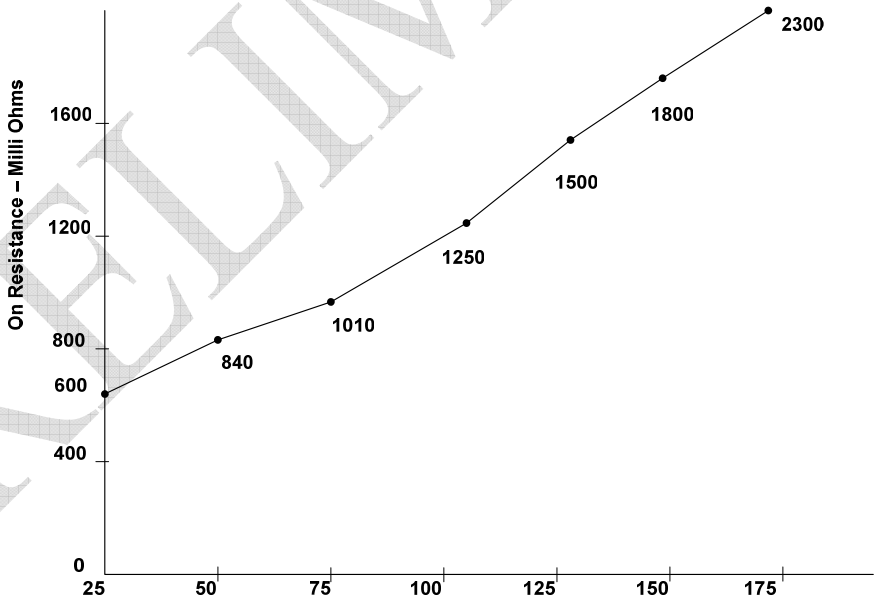

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Figure 5: Typical Application

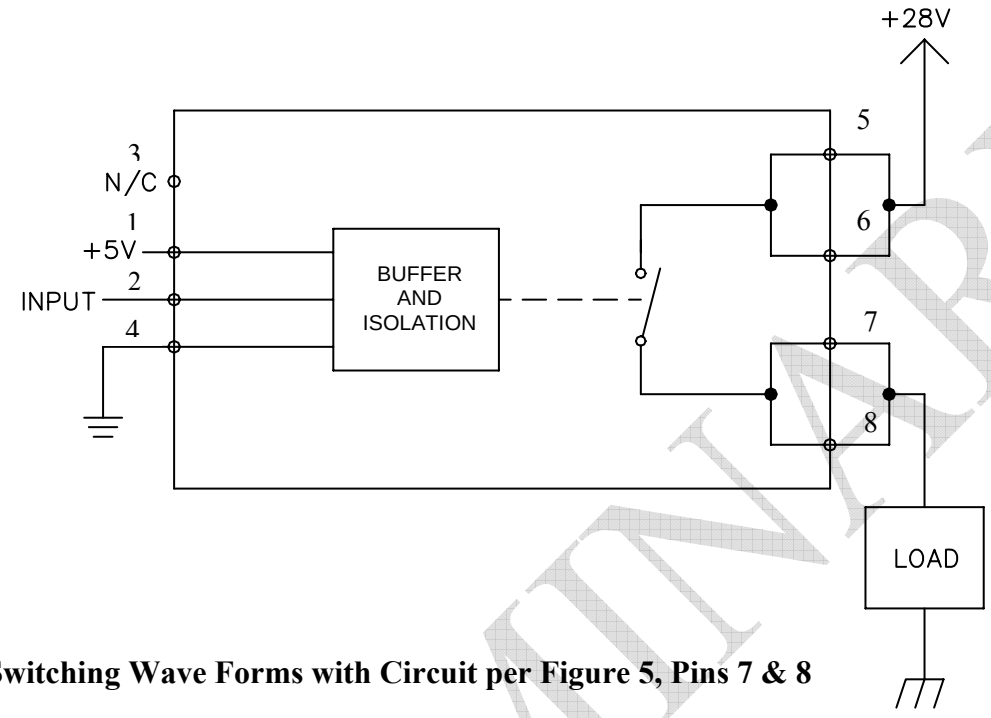
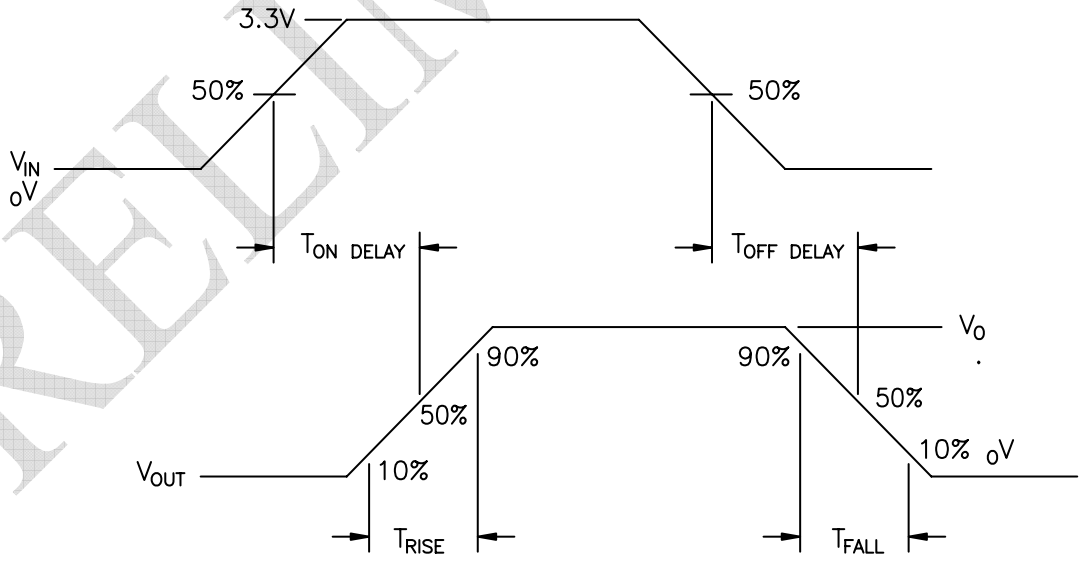


Figure 6: Switching Wave Forms with Circuit per Figure 5, Pins 7 & 8



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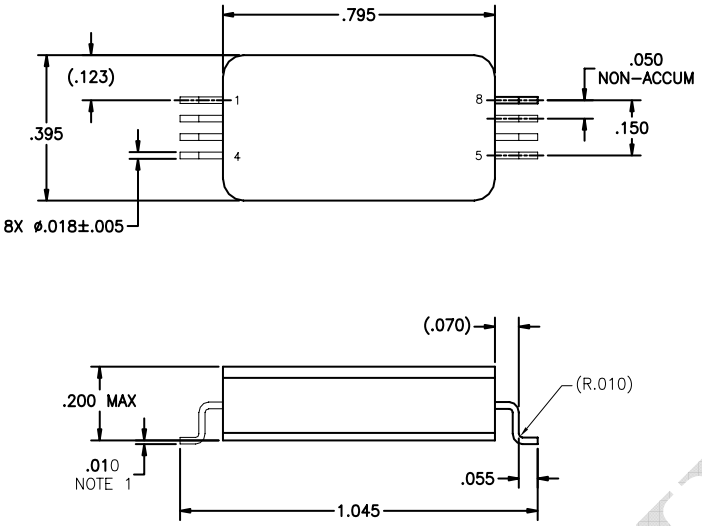
PACKAGE OUTLINES

Case for Single SSR Pin Functions



1	+5V
2	input
3	N/C
4	Gnd
5	+ out
6	+ out
7	- out
8	- out